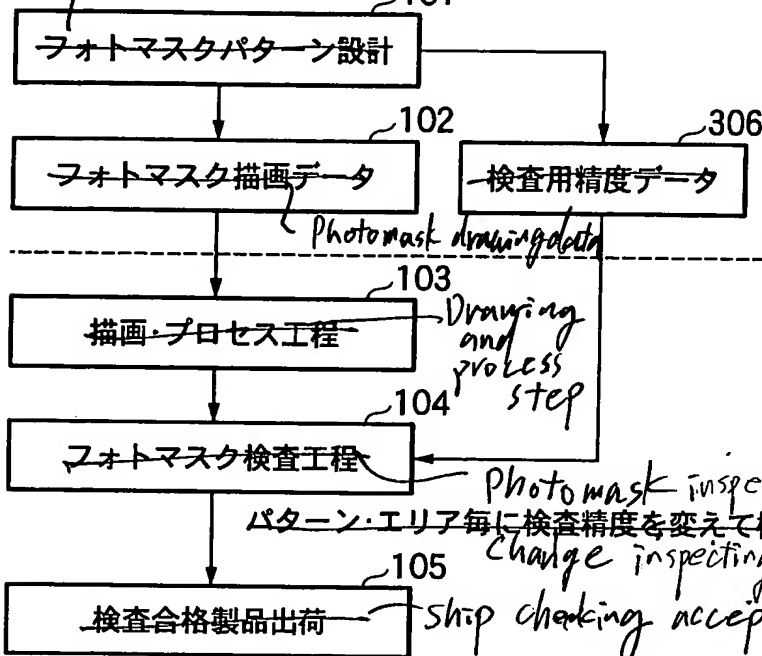


【書類名】 図面

【図1】 Design photomask pattern

Fig. 1



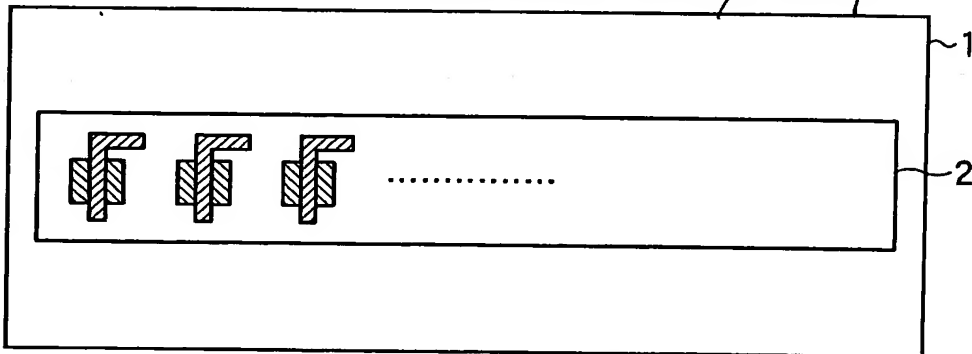
Mask pattern designing step  
Mask manufacturing step

パターン・エリア毎に検査精度を変えて検査  
change inspecting-precision for each pattern and area and carry out inspection

【図2】

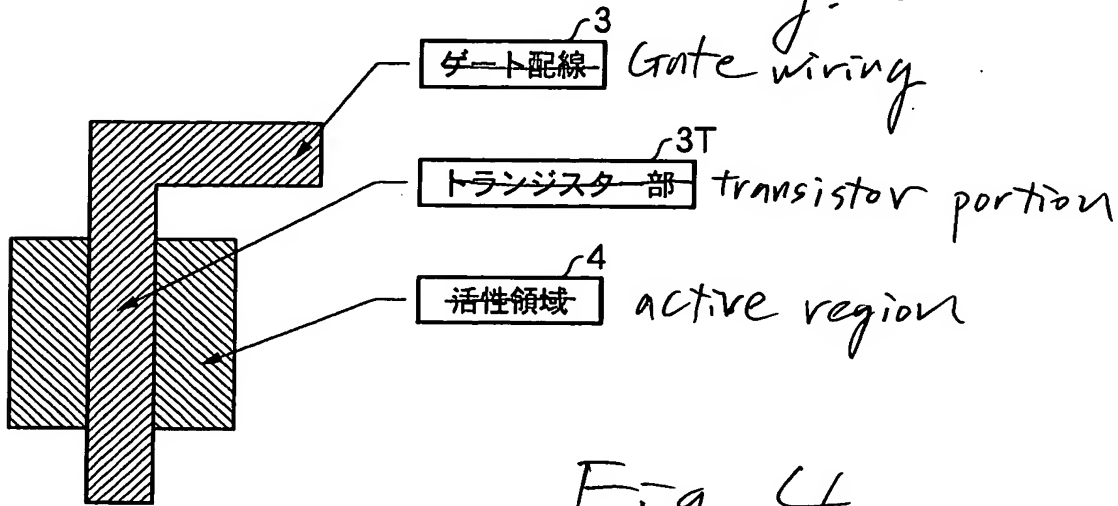
Fig. 2

トランジスタアレイチップ Transistor array chip



【図3】

Fig. 3

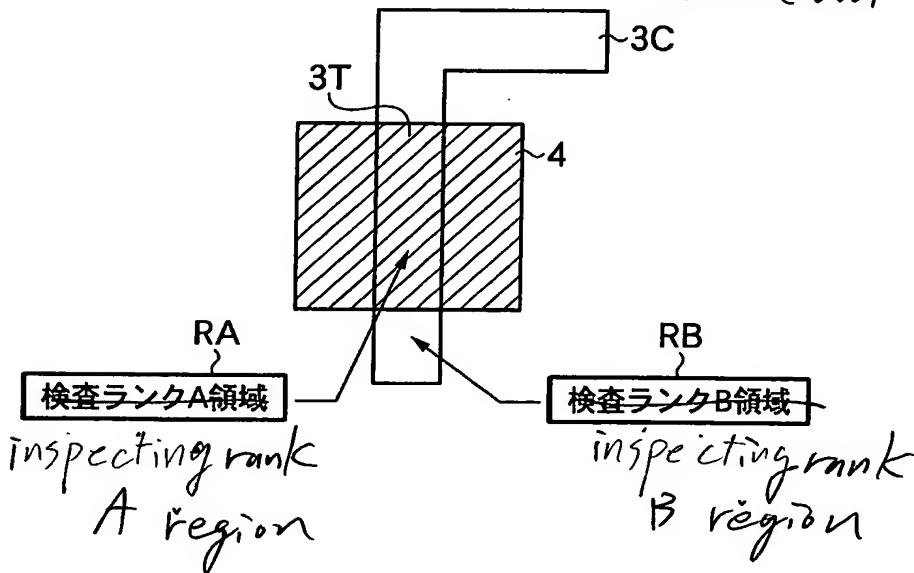


【図4】

Fig. 4

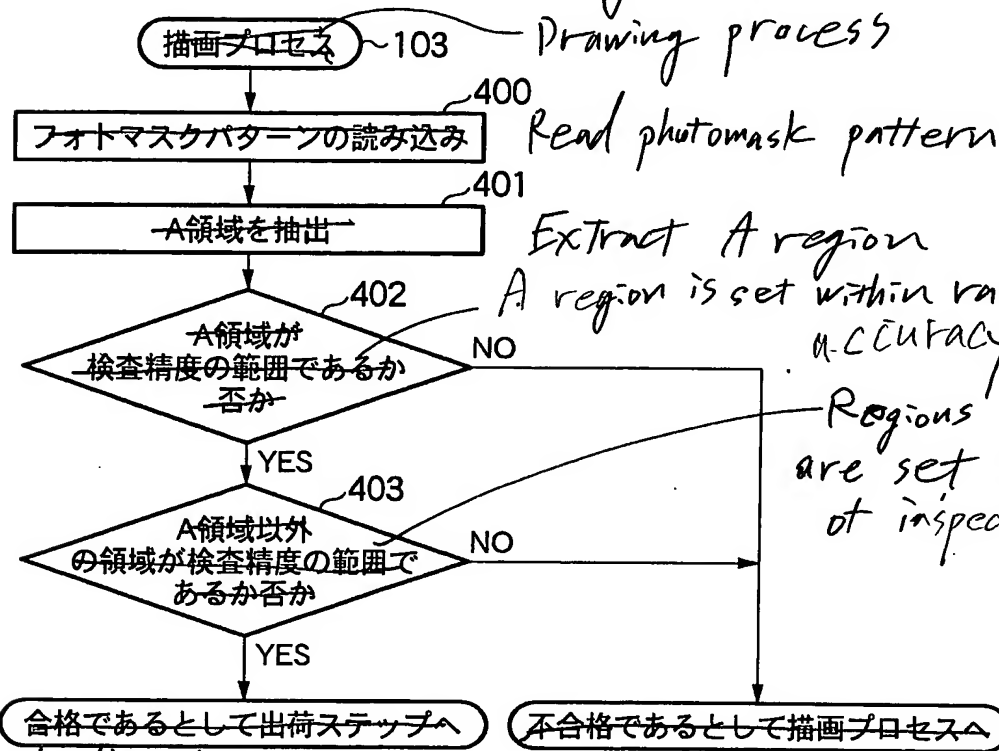
○領域で指定する場合

In the case in which specification is carried out by region



【図5】

Fig. 5

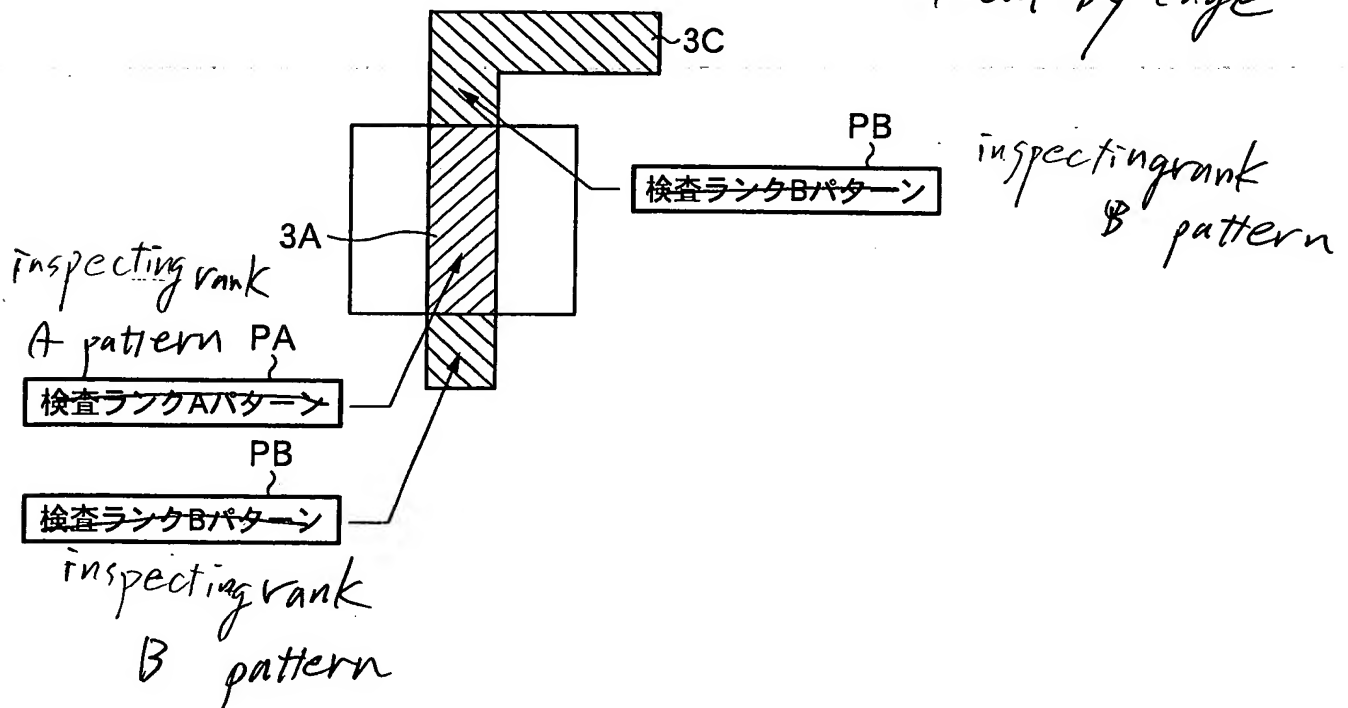


To shipping step for "accepted"

To drawing process for "rejected"

○パターンで指定する場合

In the case in which specification is carried out by edge

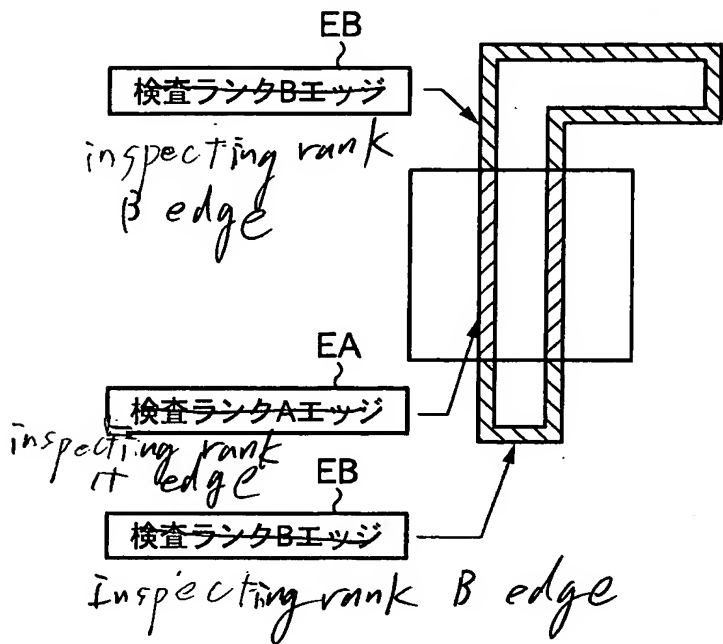


【図7】

Fig. 7.

○エッジで指定する場合

In the case in which specification is carried out by edge



【図8】

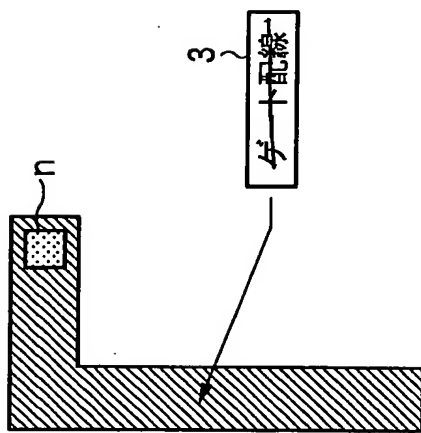


Fig. 8A

In the case in which specification is carried out by region  
○領域で指定する場合

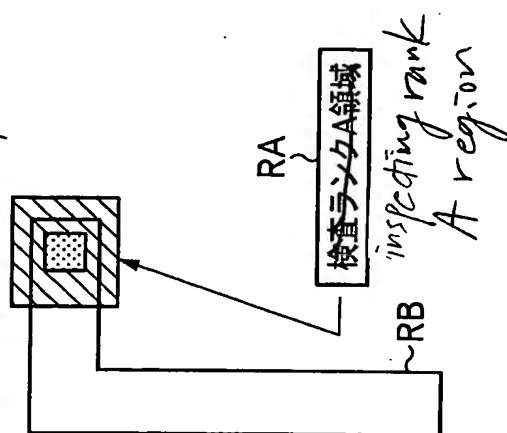


Fig. 8B

Fig. 8C

In the case in which specification is carried out by pattern  
○パターンで指定する場合

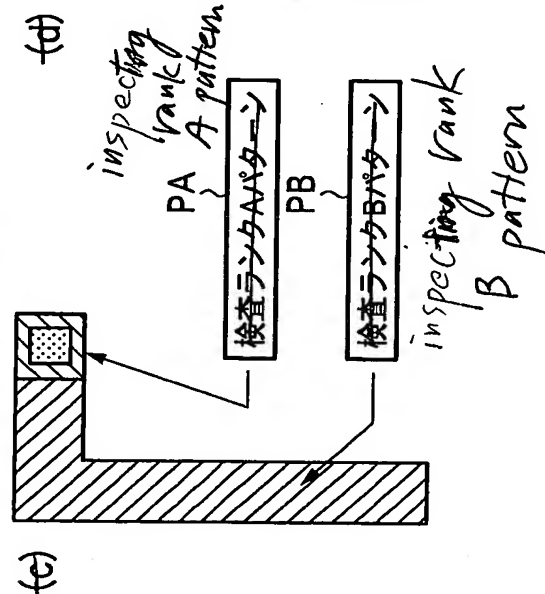
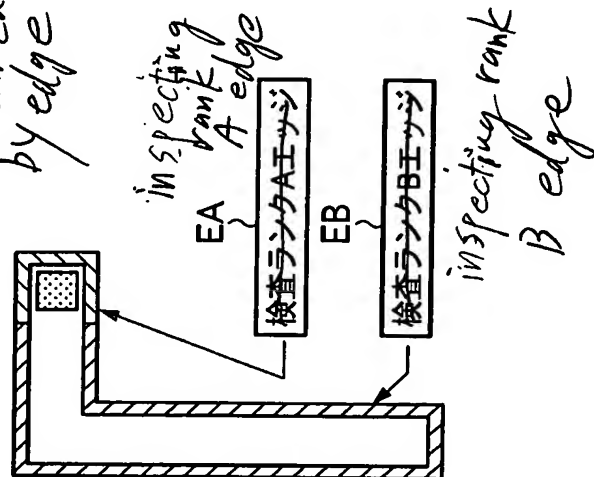


Fig. 8D  
In the case in which specification is carried out by edge  
○エッジで指定する場合



【図9】

Fig-9A

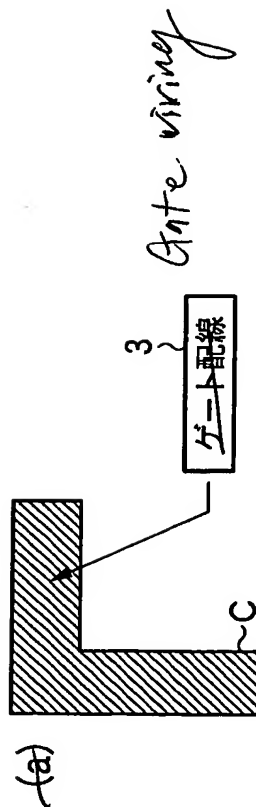


Fig. 9C

In the case in which specification is carried out by region

○領域で指定する場合

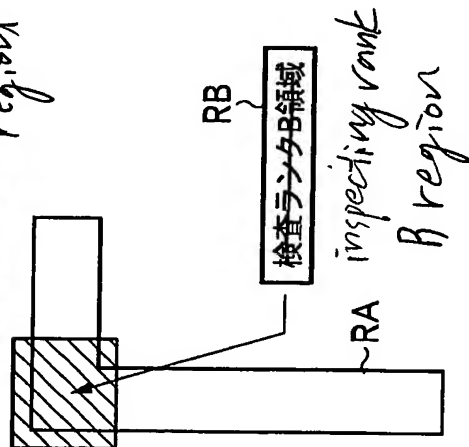


Fig. 9B

(d)

In the case in which specification is carried out by pattern

○パターンで指定する場合

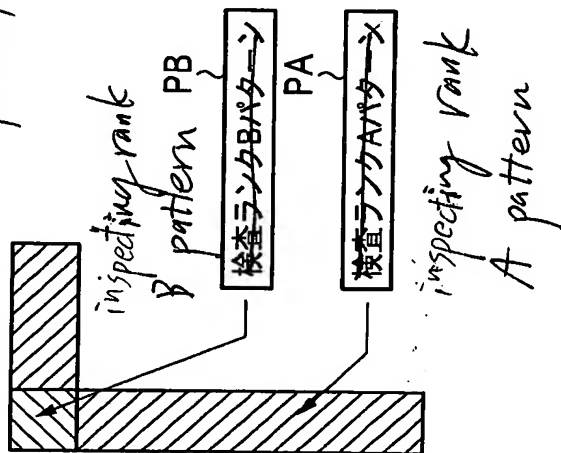
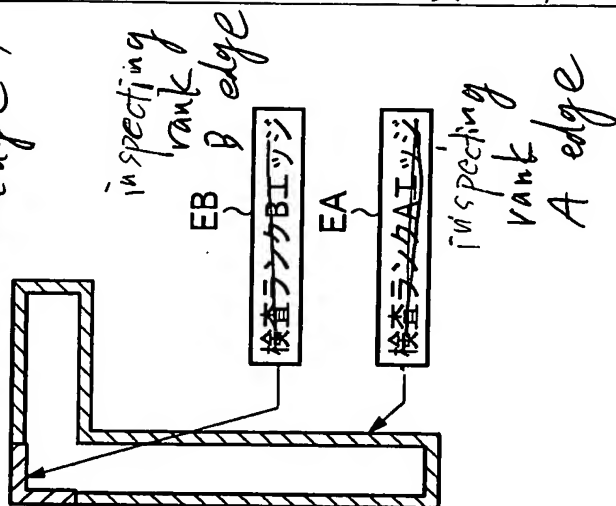


Fig. 9D

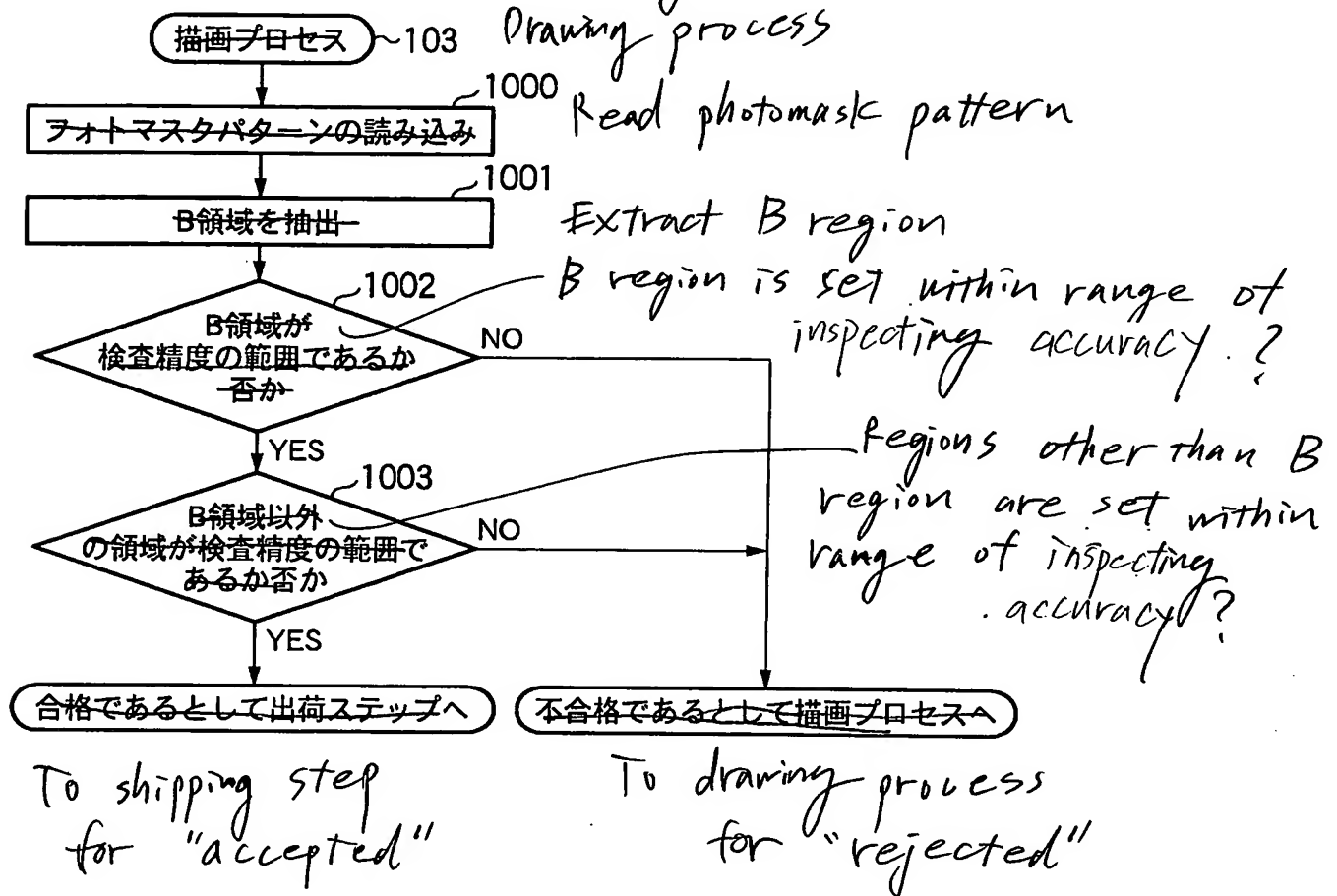
In the case in which specification is carried out by edge

○エッジで指定する場合



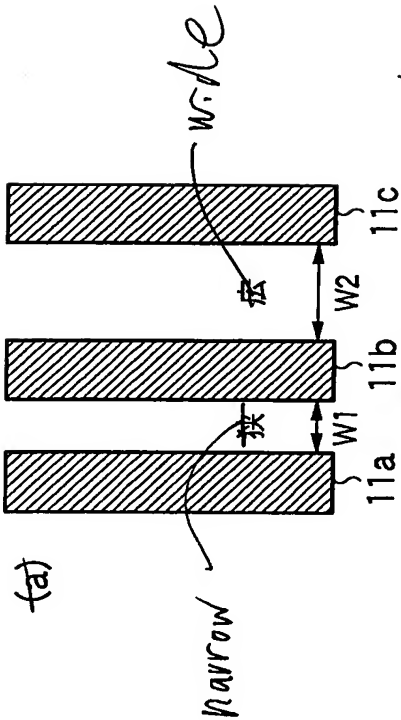
【図10】

Fig. 10



【図11】

Fig. 11A



In the case in which specification is carried out by region  
○領域で指定する場合

Fig. 11B

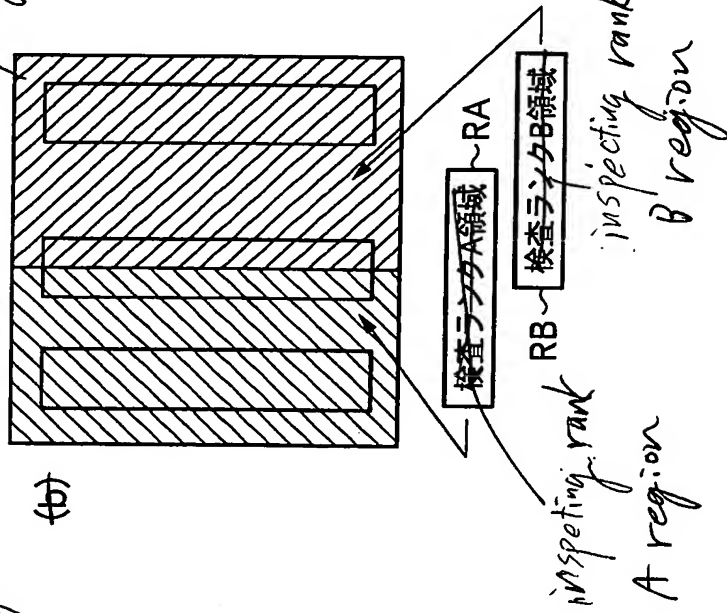


Fig. 11C

In the case in which specification is carried out by pattern  
○パターンで指定する場合

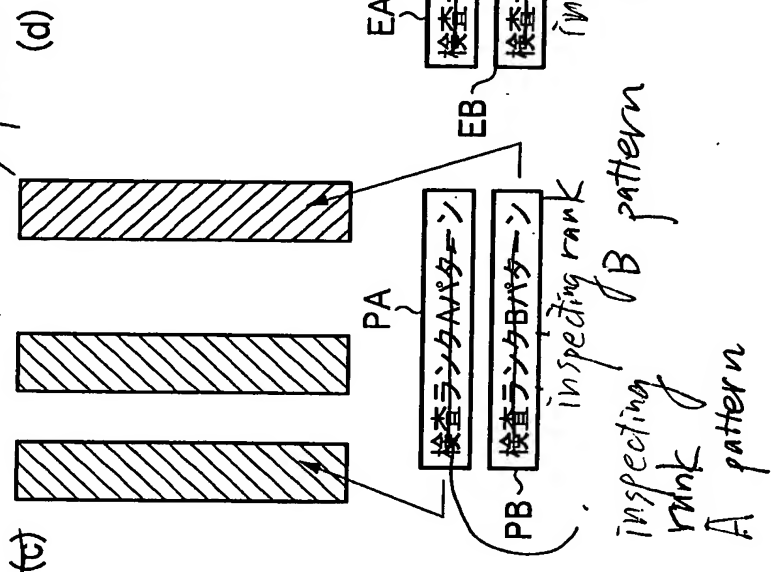
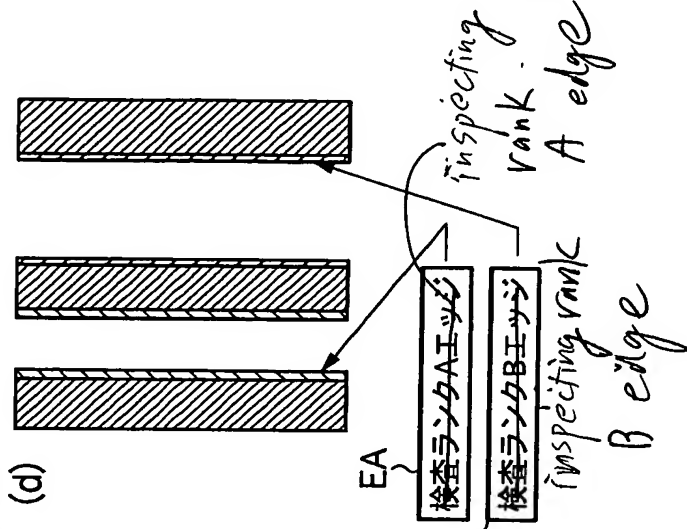


Fig. 11D

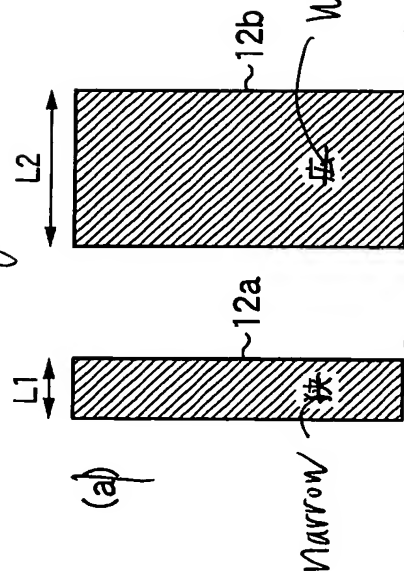
In the case in which specification is carried out by edge  
○エッジで指定する場合





【図12】

Fig. 12 A



In the case in which  
○領域で指定する場合  
is carried out by region

Fig. 12 C

In the case in which  
○パターンで指定する場合  
is carried out by pattern

Fig. 12 B

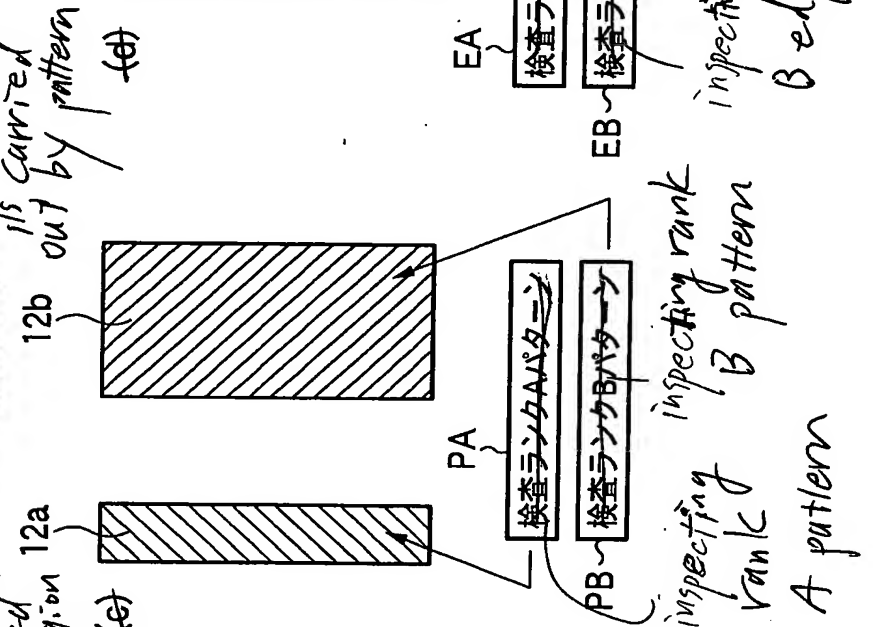
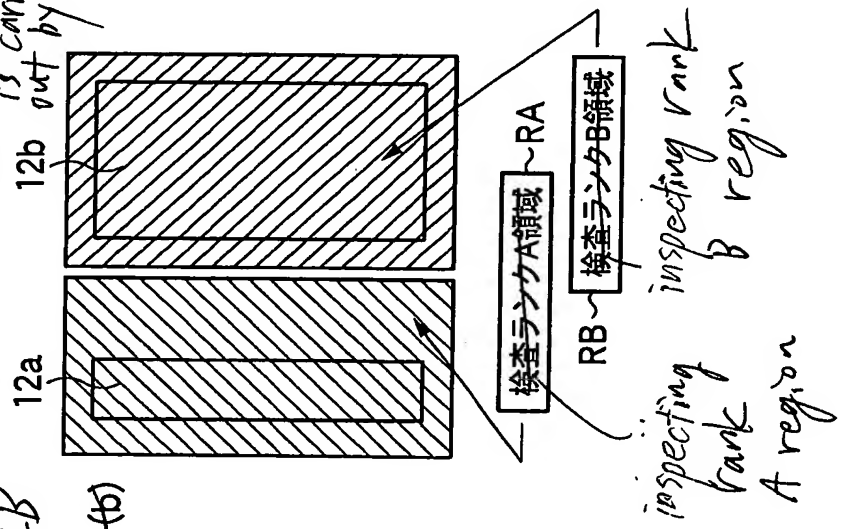
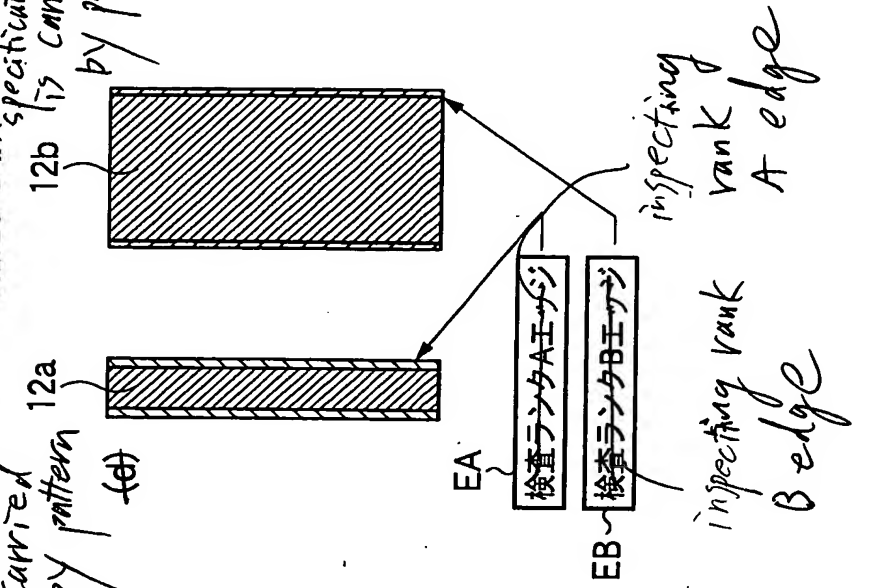


Fig. 12 D

In the case in which  
○エッジで指定する場合  
is carried out by pattern



【図13】

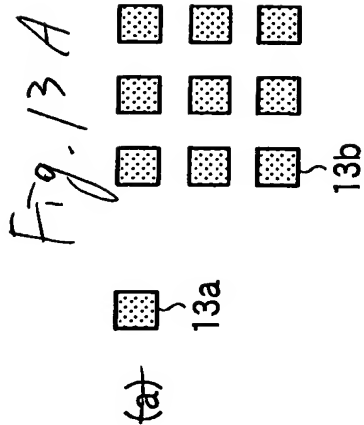


Fig. 13B In the case in which specification is carried out by region

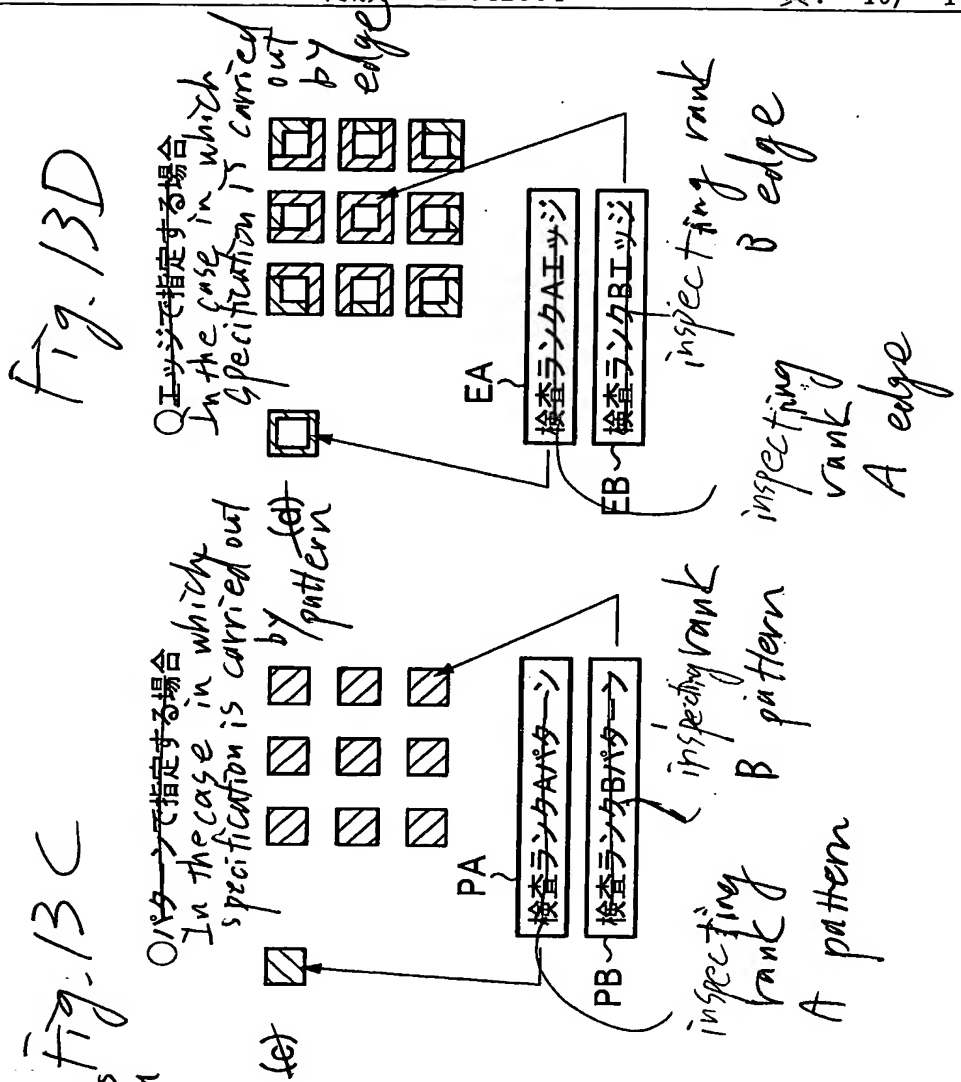
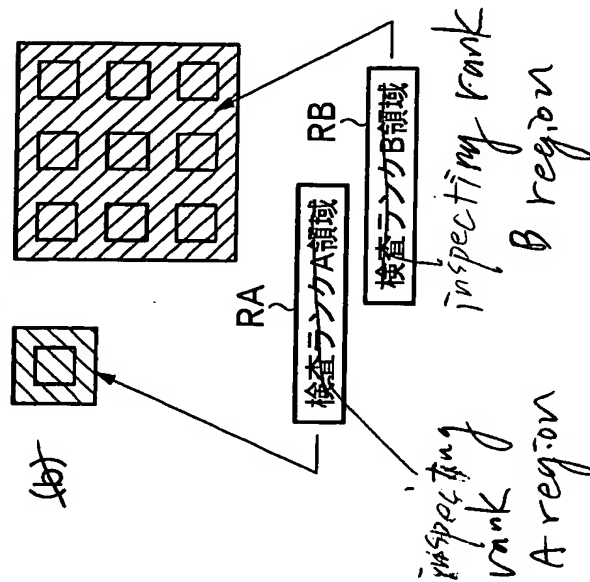


Fig. 14A

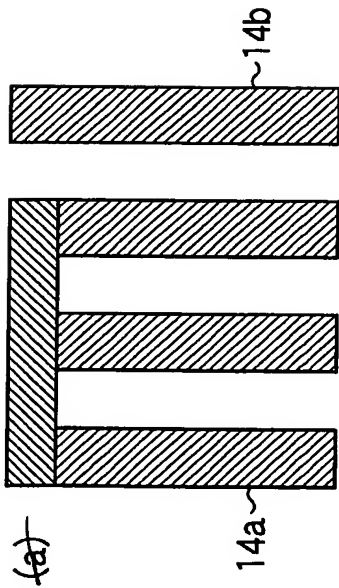


Fig. 14C

In the case in which specification is carried out by pattern

Fig. 14B

In the case in which specification is carried out by region

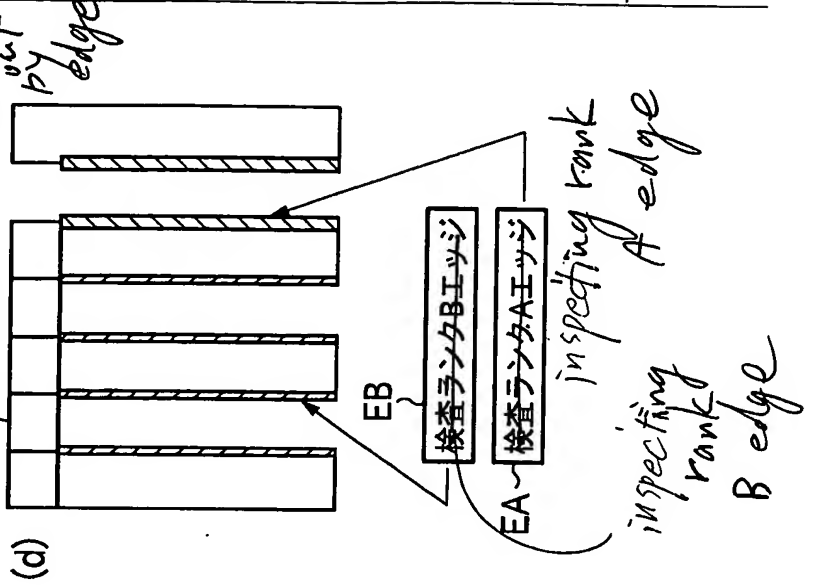
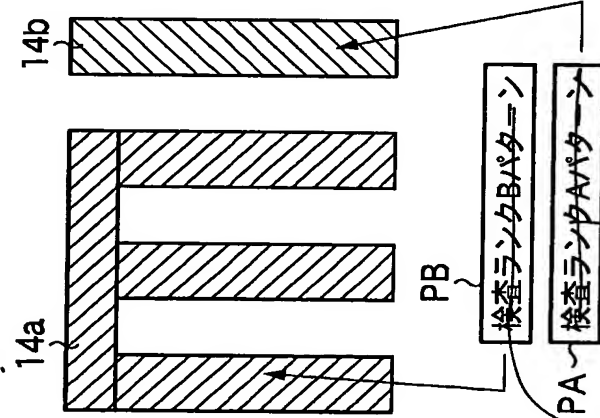
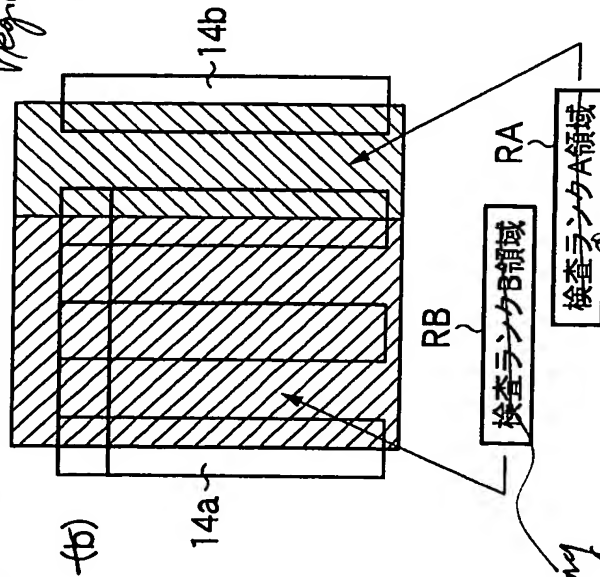


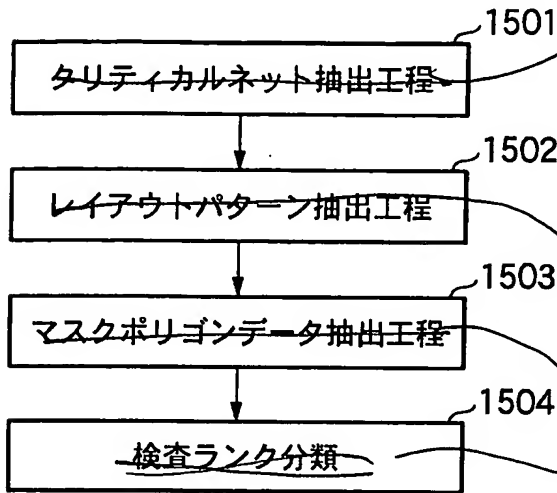
Fig. 14D

In the case in which specification is carried out by edge

inspecting rank B region  
inspecting rank A region  
inspecting rank B pattern  
inspecting rank A pattern  
inspecting rank B edge  
inspecting rank A edge

【図15】

Fig. 15



Critical net extracting step

タリディカルの例

- ・クロックネット
- ・タイミング制約設定ネット
- ・アナログネット
- (抵抗値・容量の精度が要求される)
- ・高速信号ネット etc

Example of critical

- ・ Clock net
- ・ Timing constraint setting net
- ・ Analog net (precision in resistance value and capacity is required)
- ・ High-speed signal net etc

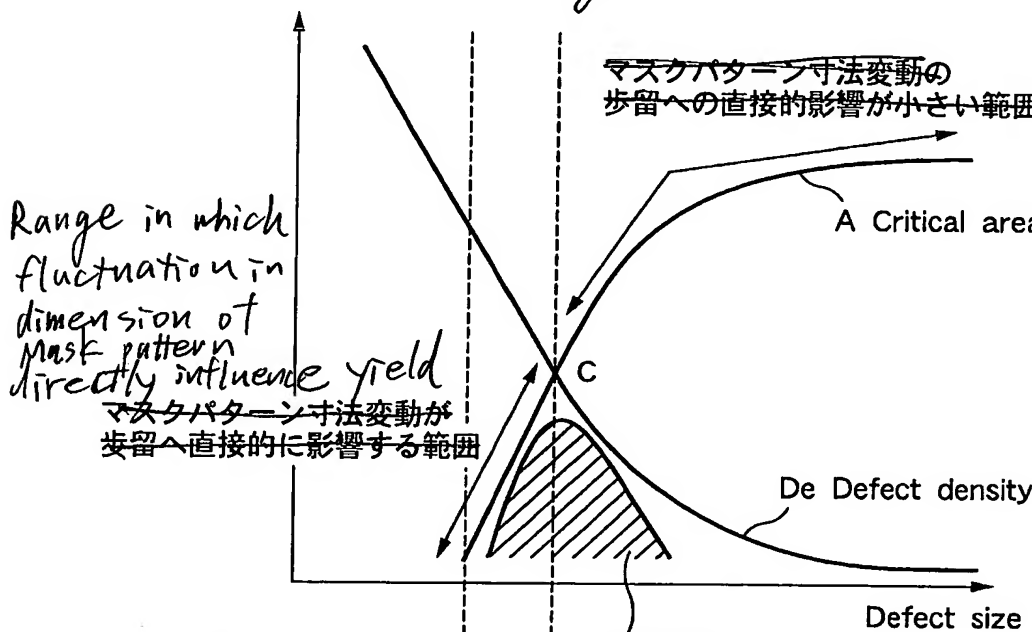
Layout pattern extracting step

Mask polygon data extracting step

inspecting rank classification

【図16】

Fig. 16



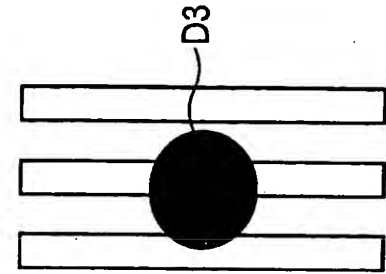
Range in which direct influence of fluctuation in dimension of mask pattern on yield is small

Minimum design rule (2002年量産ベースで130nm) (on mass production basis in 2002)

Threshold of inspecting accuracy

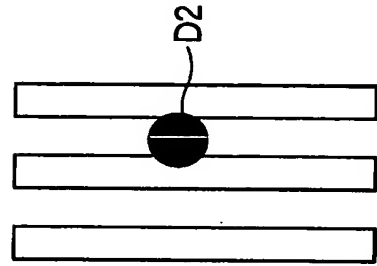
【図17】

Fig. 17C



(c)

Fig. 17B

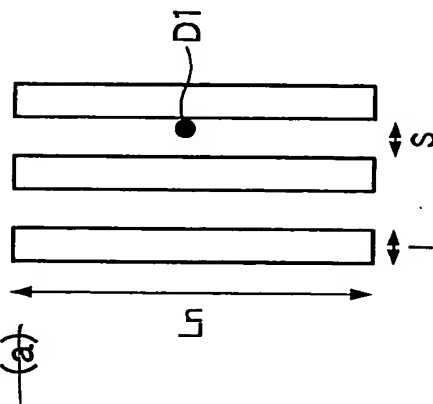


(b)

Fig. 17A

Defect

Short不良 Area =  $Ln(l+S)$



(a)

Defect size (x) < S

No short defect ~~Short不良~~

$$Ca(x) = 0$$

S < Defect size (x) < 2l+S

~~場所によつてはShort不良~~

Short defect in

$$Ca(x) = \frac{Ln(l+S)(X-S)}{(l+S)}$$

Some places

2l+S < Defect size (x)

~~必ずShort不良~~

$$Ca(x) = Ln(l+S)$$

Short defect in all places

【図18】

Fig. 18A

(a)

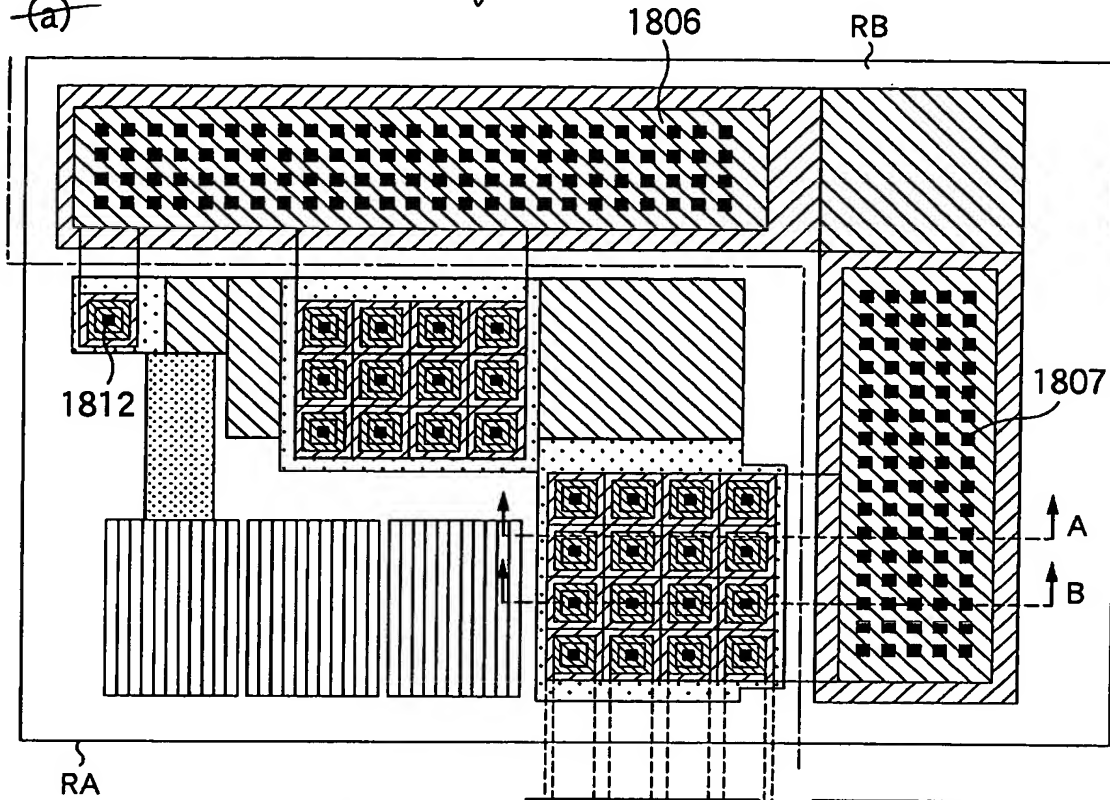


Fig. 18B(b) A断面  
A section

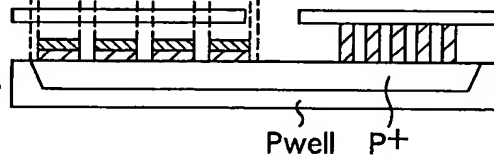
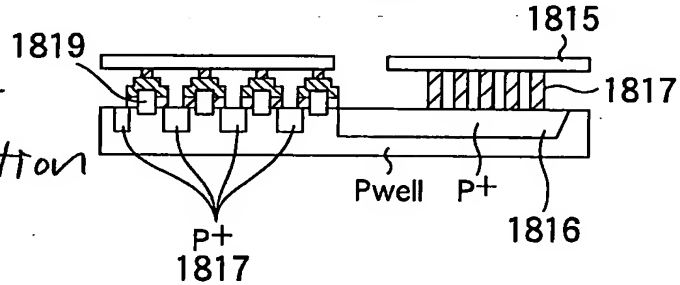


Fig. 18C(c) B断面  
B section



【図19】

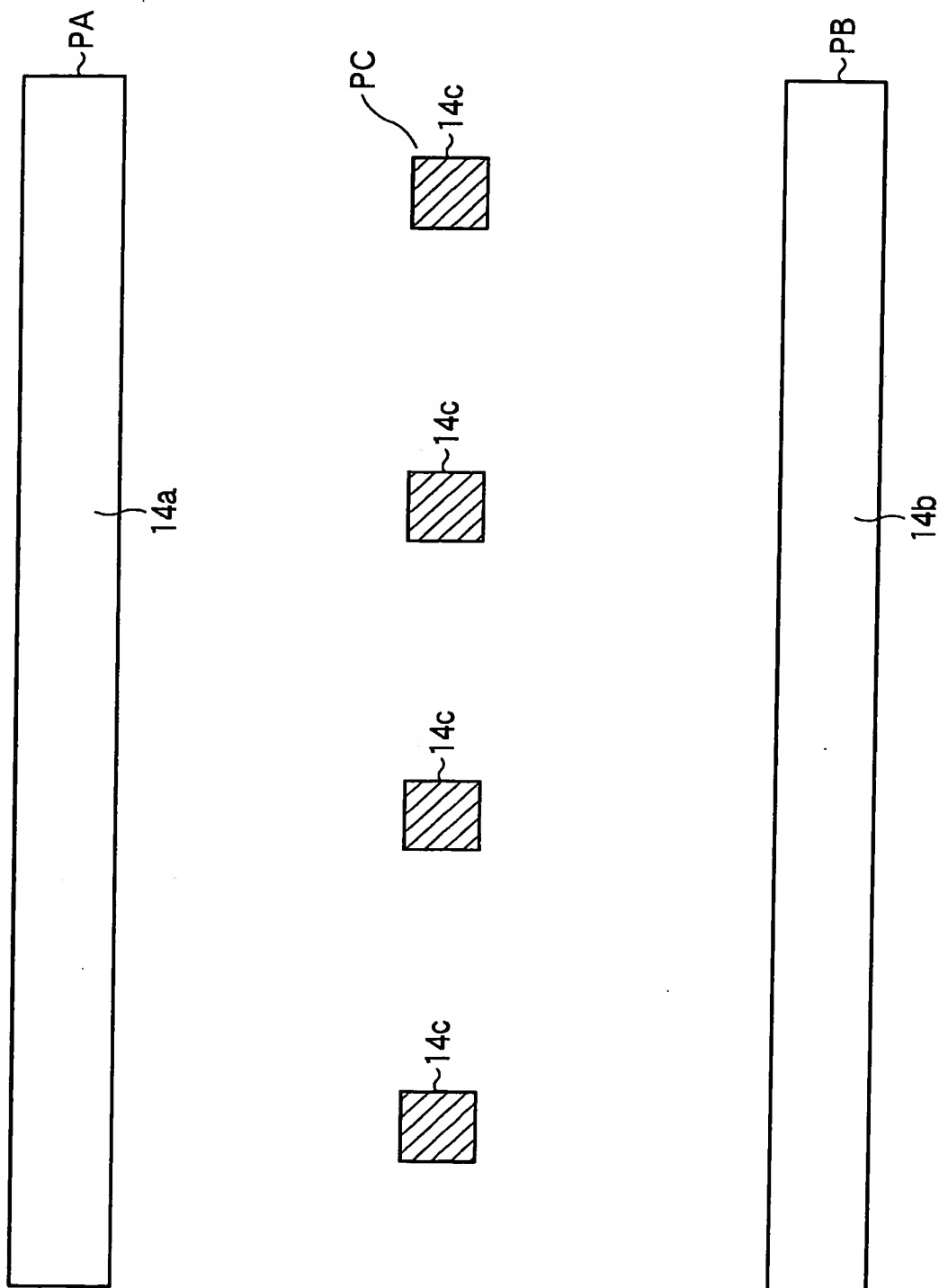
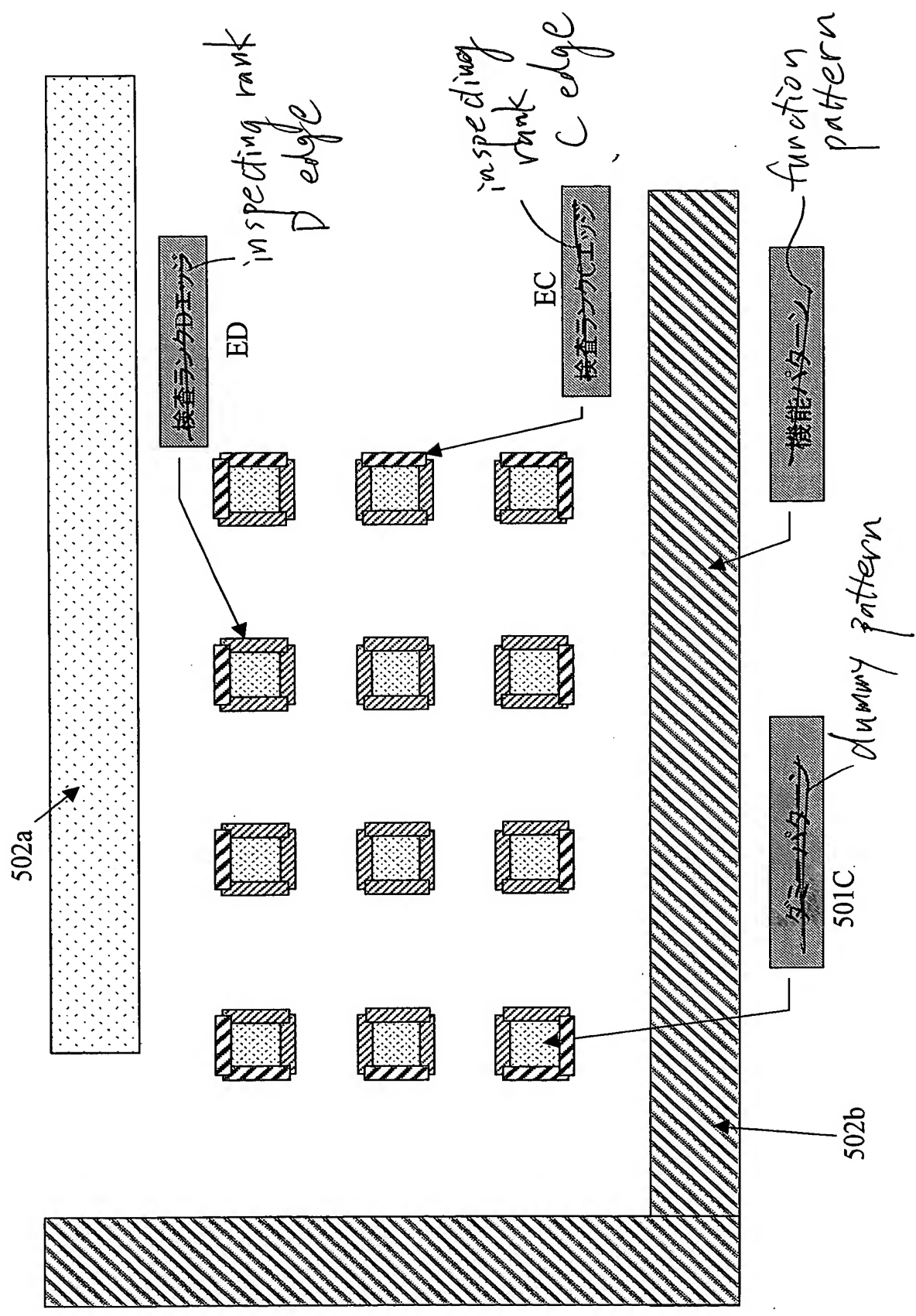


Fig. 19

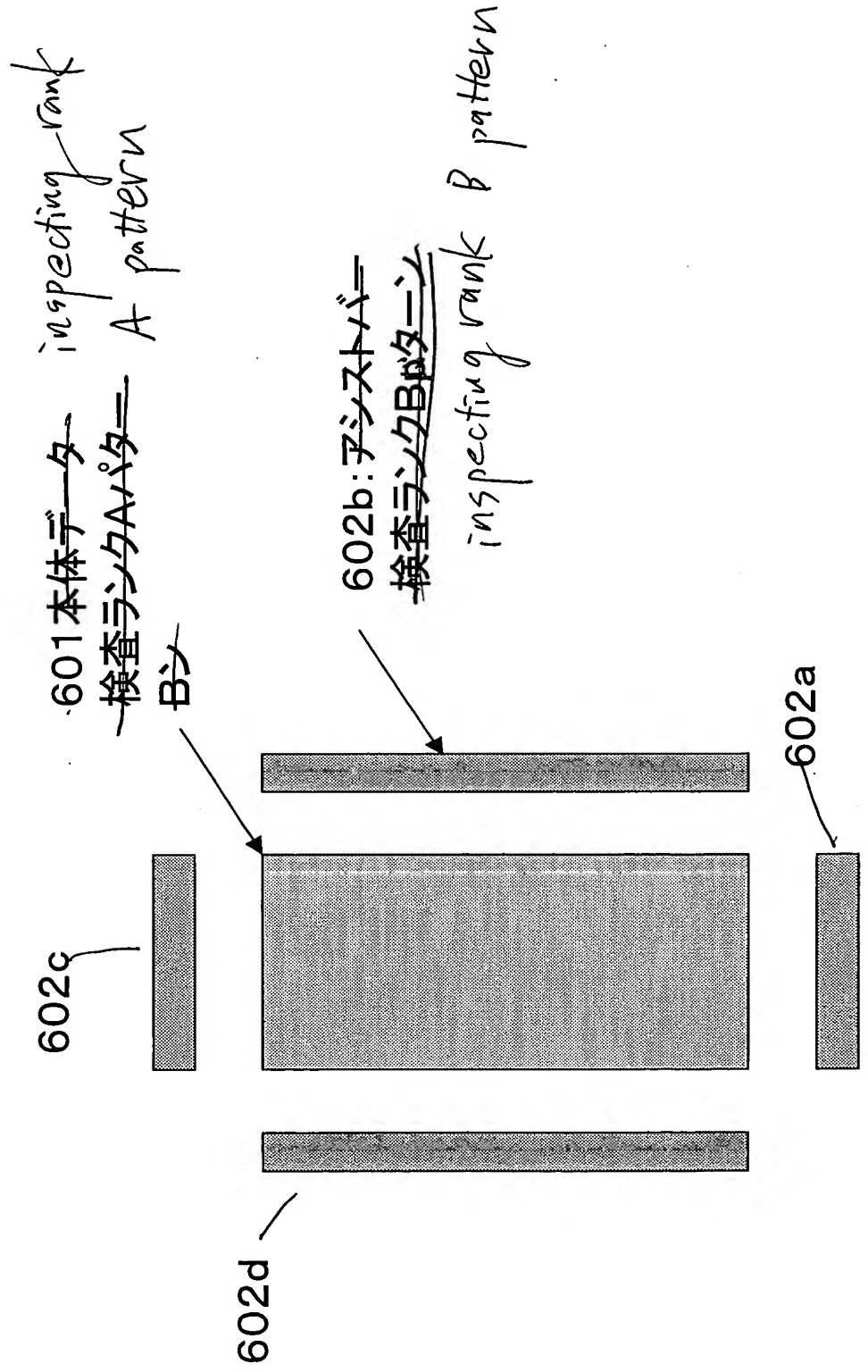




# アシストバーへの適用例

図21

Fig. 21



# 位相シフトマスク(エンハンサー)への適用例

図22

Fig. 22

702C

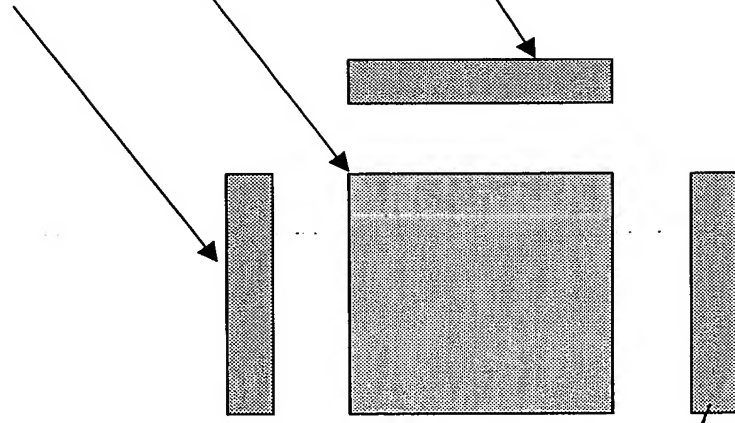
701:メイン開口部(本体パターン)  
ガラスの掘り込みによって  
180°位相がシフトした開口部  
(開口部以外と360°ずれた同位相)

702d

702b:サブ開口部  
0°の開口部

開口部以外  
180°のハーフト=ン膜

702a



# 位相シフトマスク(エンハンサー)への適用例

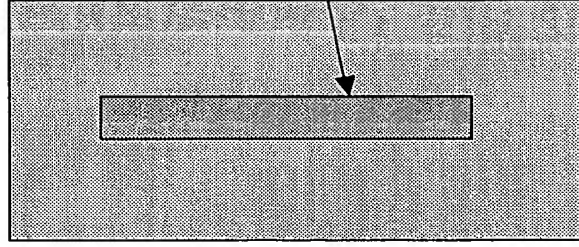
図23

Fig. 23

801:遮光部(本体パターン)

802:180°の位相シフター

本体パターン以外  
0°の開孔



# 位相シフトマスク(CPL)への適用例

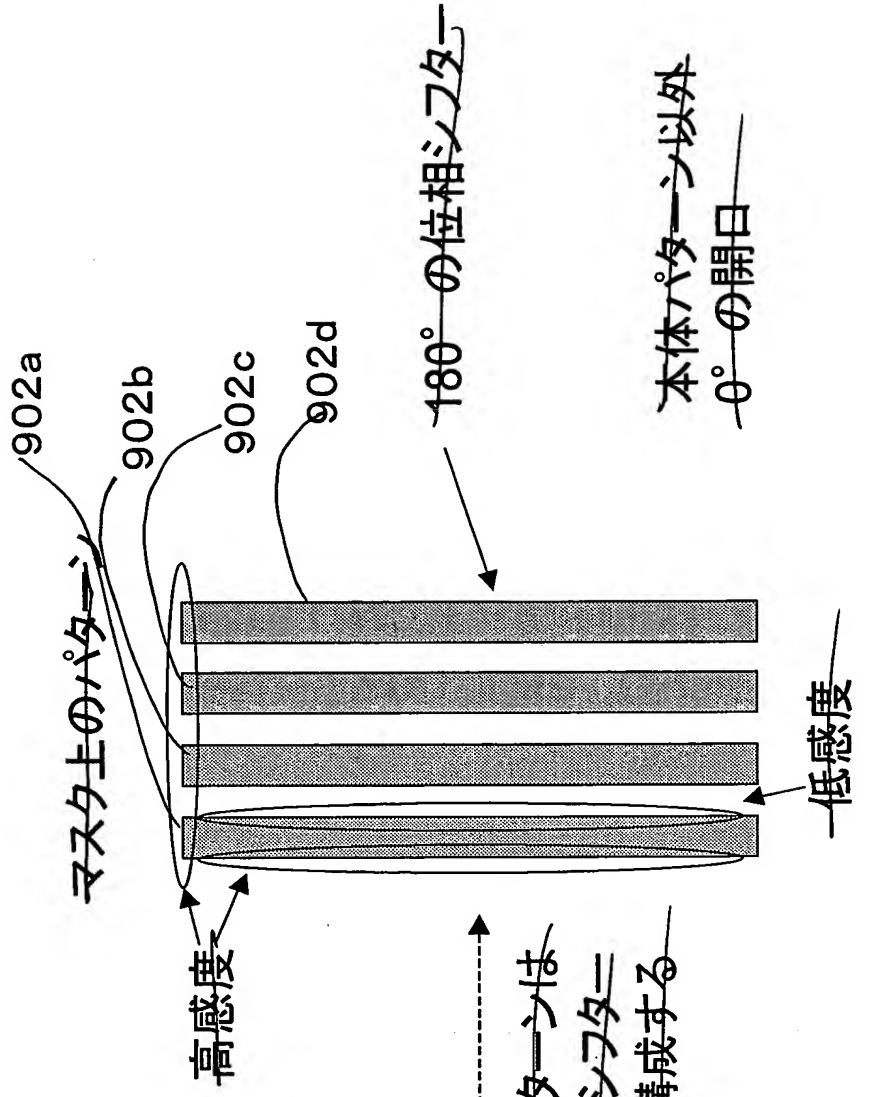
図24

Fig. 24A

Fig. 24B

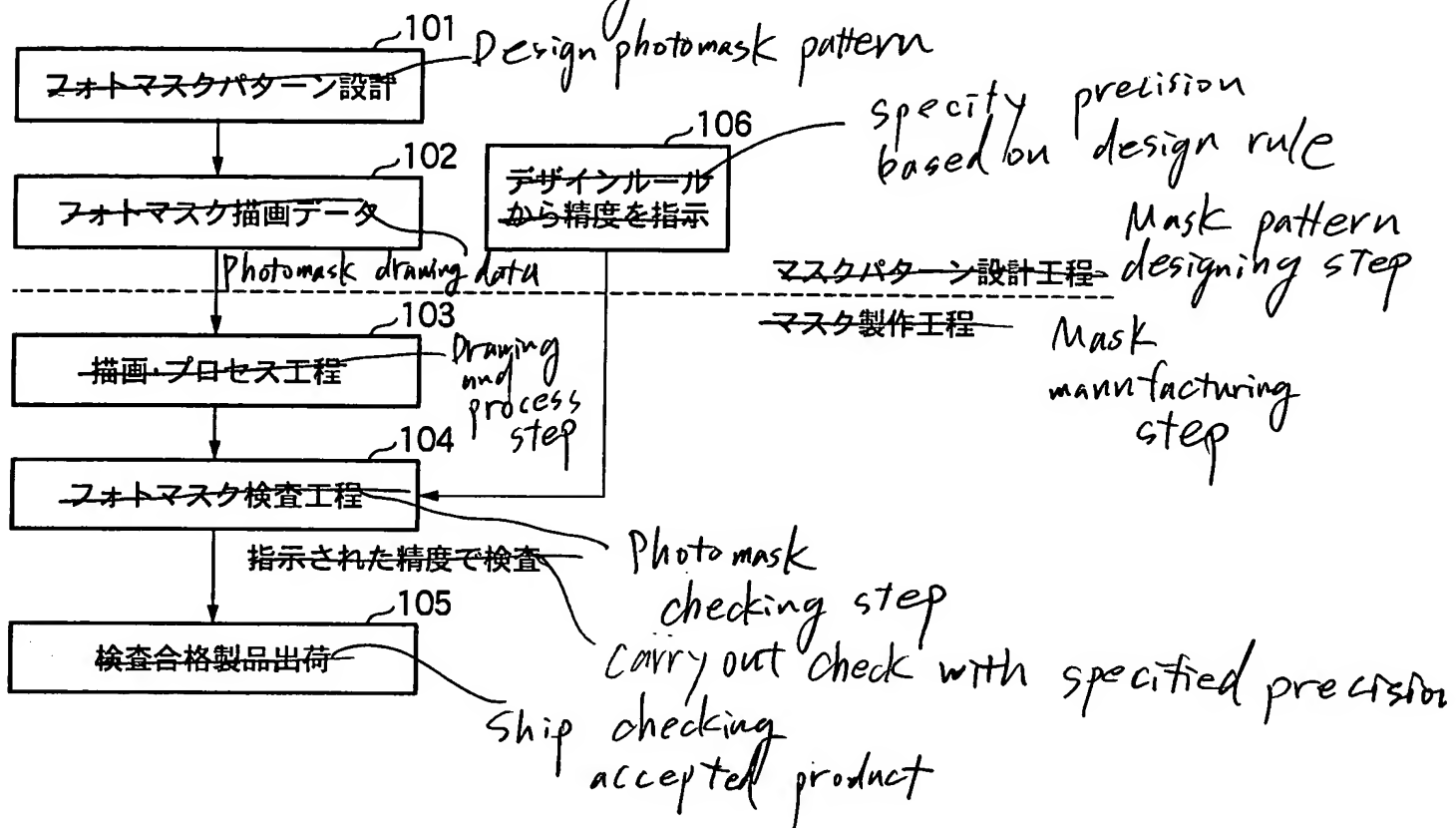
解像したい本体パターン

901



【図20】

Fig. 25

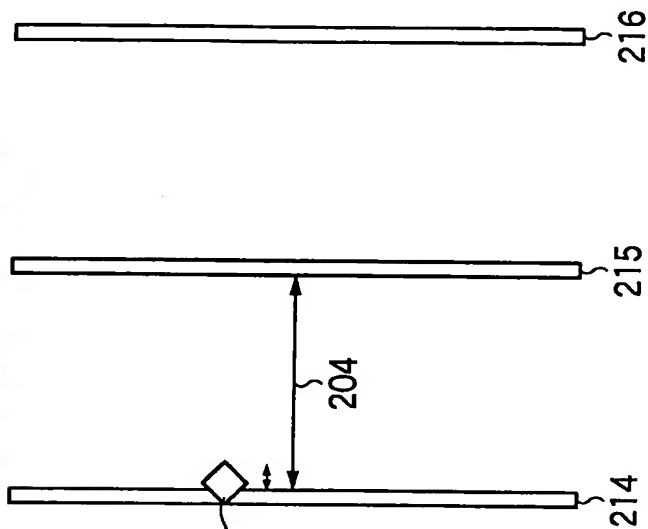


【図21】

(b) 配線間隔の広い配線時の欠陥

Fig. 26B

Detect in wiring with large wiring interval



(a) 最小間隔の配線時の欠陥

Fig. 26A

Detect in wiring with minimum interval

